App No.: NEW Docket No.: 3749-0111PUS1 Inventor: Yasuhiro NISHIDA et al.

Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE **NEW SHEET**

Sheet 1 of 10

Fig. 1

App No.: NEW Docket No.: 3749-0111PUS1

Sheet 2 of 10

Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE

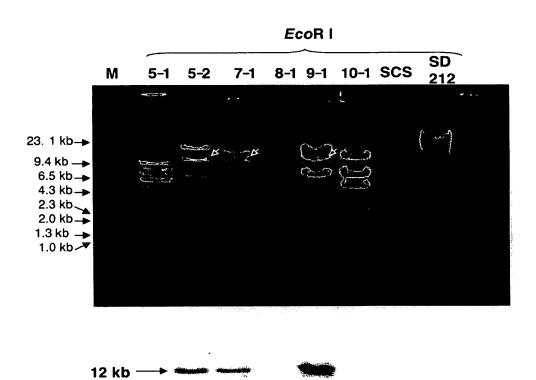
NEW SHEET

Fig. 2

2,3,2',3'-Tetrahydroxy- β , β -carotene-4,4'-dione

App No.: NEW Docket No.: 3749-0111PUS1 Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE NEW SHEET Sheet 3 of 10

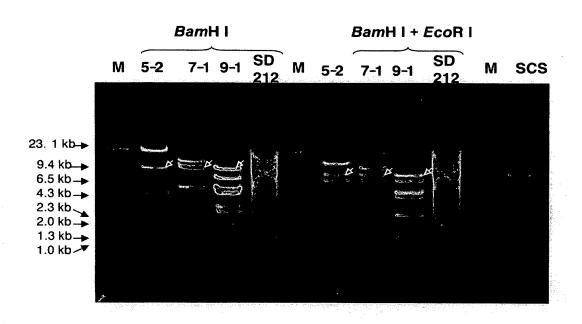
Fig.3



App No.: NEW Docket No.: 3749-0111PUS1 Inventor: Yasuhiro NISHIDA et al.

Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE NEW SHEET Sheet 4 of 10

Fig. 4

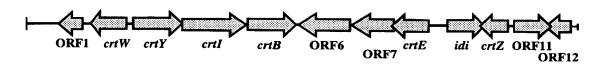




App No.: NEW Inventor: Yasuhiro NISHIDA et al. Docket No.: 3749-0111PUS1 Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE **NEW SHEET**

Sheet 5 of 10

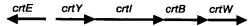
Fig. 5



Astaxanthin biosynthesis gene cluster

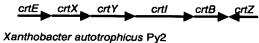
Agrobacterium aurantiacum (Paracoccus sp. MBIC01143) crtW_crtZ_crtY_crtl Erythrobacter longas Och 101

Canthaxanthin biosynthesis gene cluster of Bradyrhizobium sp. ORS278



Zeaxanthin biosynthesis gene cluster

Erwinia uredovora 20D3 (Pantoea ananatis)

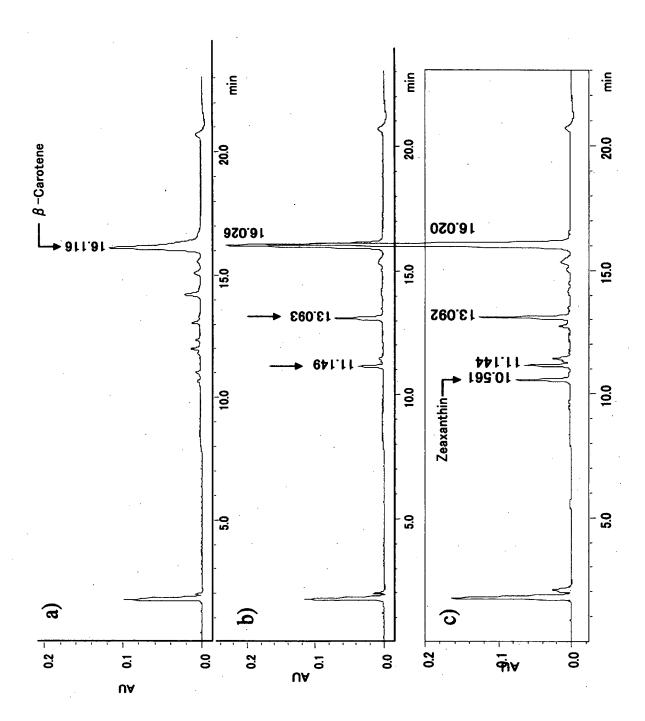


crtY crtI crtB crtX

App No.: NEW Docket No.: 3749-0117
Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE
NEW SHEET Sheet Docket No.: 3749-0111PUS1

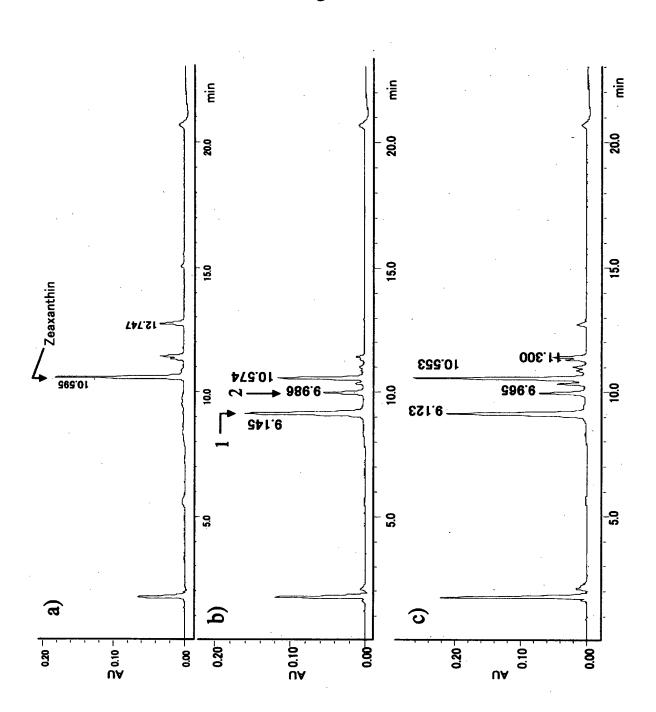
Fig. 6

Sheet 6 of 10



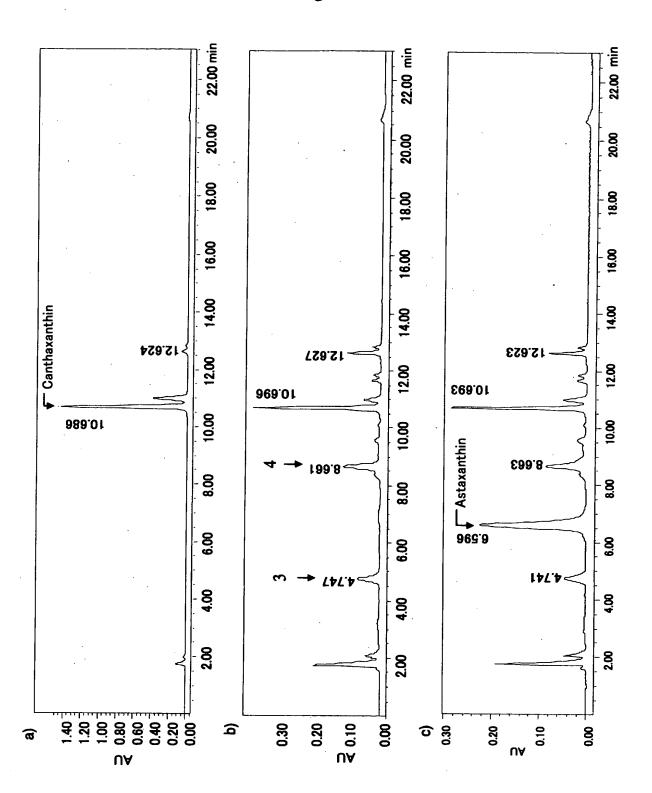
App No.: NEW Docket No.: 3749-0111PUS1
Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR
PREPARING HYDROXYLATED CAROTENOID, AND NOVEL
GERANYLGERANYL PYROPHOSHATE SYNTHASE
NEW SHEET Sheet 7 of 10

Fig. 7



App No.: NEW Docket No.: 3749-0111PUS1 Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE NEW SHEET Sheet 8 of 10

Fig. 8

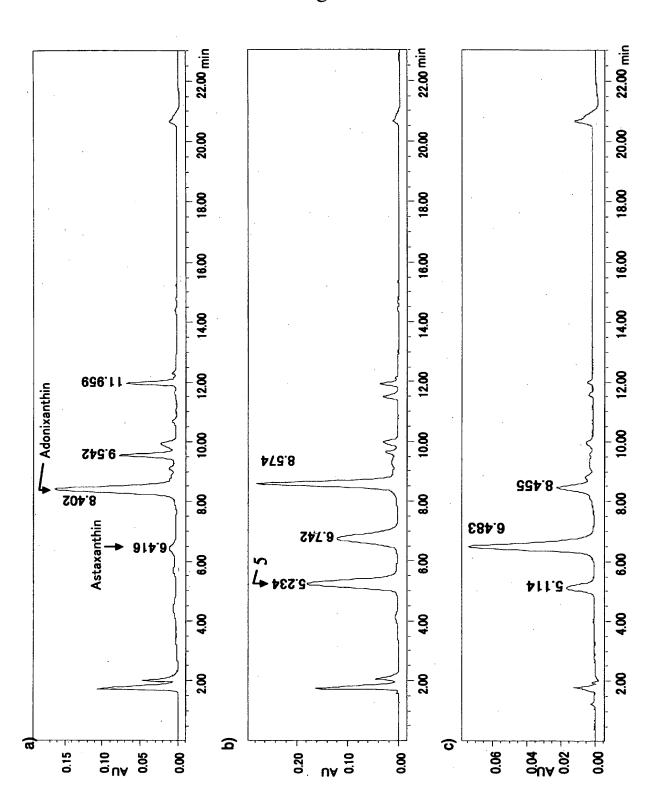


Docket No.: 3749-0111PUS1

App No.: NEW
Inventor: Yasuhiro NISHIDA et al.
Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE
NEW SHEET
Sheet 9

Sheet 9 of 10

Fig. 9



App No.: NEW Inventor: Yasuhiro NISHIDA et al. Docket No.: 3749-0111PUS1

Title: NOVEL CAROTENOID HYDROXYLASE GENE, METHOD FOR PREPARING HYDROXYLATED CAROTENOID, AND NOVEL GERANYLGERANYL PYROPHOSHATE SYNTHASE

NEW SHEET

Sheet 10 of 10

Fig.10

carotene-4,4'-dione